I CLAIM:

1. An imaging system for imaging objects, said system comprising:

   (a) an illumination source producing a light beam directed along an optical path toward said object;

   (b) a scan lens for focusing said light beam to a diffraction-limited configuration in a prescribed object plane, said scan lens having an external entrance pupil;

   (c) a scanner for scanning said light beam to move said diffraction-limited configuration in a pre-determined scan pattern on said object plane;

   (d) said scan lens being movable relative to said object to achieve coarse focusing;

   (e) a focusing lens being movable relative to said scan lens to achieve fine focusing; and

   (f) a detector located to receive light from said object plane and a display to produce a signal from said detector.

2. An imaging system as claimed in claim 1 wherein said scan lens is in a fixed position relative to said object during fine focusing.

3. An imaging system as claimed in claim 1 wherein said focusing lens is located between said object and said light source.

4. An imaging system as claimed in claim 1 wherein said focusing lens is located between said light source and said detector.

5. An imaging system as claimed in claim 1 wherein said focusing lens is located between said detector and said scanner.

6. An imaging system as claimed in claim 4-5 wherein said imaging system is a multi-photon or two-photon system.

7. An imaging system as claimed in claim 1 wherein said scan lens is a liquid immersion scan lens and there is an immersion liquid between said scan lens and said object when said system is operational.

8. An imaging system as claimed in claim 1 wherein said system is a confocal imaging system and there is a detection arm located between said scanner and said detector, said detection arm receiving light from said diffraction-limited configuration in said object plane, said detection arm having a pinhole and a focusing lens to obtain a focal point for confocal detection of said light returning from said object, said detector being located behind said pinhole, there being a beamsplitter located between said detection arm and said object, said beamsplitter directing light returning from said object into said detection arm.

9. An imaging system as claimed in claim 1 wherein said system is a non-confocal imaging system and there is a detection arm located

between said detector and said object, said detection arm receiving light from said diffraction-limited configuration in said object plane.

10. An imaging system as claimed in claim 9 wherein said detection arm has a first condenser lens therein, said detector being located behind said first condenser lens.

11. An imaging system as claimed in claim 10 wherein there is a beamsplitter located between said object and said detection arm, said beamsplitter directing light returning from said object into said detection arm.

12. An imaging system as claimed in claim 11 wherein there is a scanning mirror to de-scan light returning from said object, said scanning mirror being located between said beamsplitter and said object.

13. An imaging system as claimed in claim 7 wherein there is a side wall surrounding said scan lens, said side wall extending between said scan lens and said object, said side wall having a substantial sealing relationship with said scan lens and said object to retain said immersion liquid of said liquid-immersion scan lens between said scan lens and said object.

14. An imaging system as claimed in claim 1 wherein said system is constructed to allow fine focusing during operation of said system to image said object.

15. An imaging system as claimed in any one of claims 1, 2 or 3 wherein said scan lens is a telecentric f*theta liquid-immersion scan lens.

16. An imaging system as claimed in any one of claims 1, 2 or 3 wherein said scan lens is a telecentric f*theta scan lens.

17. An imaging system as claimed in any one of claims 1, 2, 3 or 6 wherein said detector is a spectrally-resolved detector.

18. An imaging system as claimed in any one of claims 1, 2 or 3 wherein there are means for supporting said object to be imaged.

19. An imaging system as claimed in any one of claims 1, 2 or 3 wherein there is a support for said object to be imaged, said support being capable of moving said object relative to said system.

20. A imaging system as claimed in any one of claims 1, 2, 3 or 6 including a second condenser lens and a transmission detector placed on an opposite side of said object, said condenser lens and said transmission detector being coaxial with said scan lens, where light transmitted through said specimen is detected.

21. An imaging system as claimed in any one of claims 1, 2 or 3 wherein said illumination source is a laser.

22. An imaging system as claimed in any one of claims 1, 2 or 3 wherein a laser rejection filter is placed in front of said detector, said imaging system being a multi-photon or two photon imaging system whereby said illumination source is a short pulse laser to excite multi-photon or two-photon fluorescence respectively in said object.

23. An imaging system as claimed in any one of claims 1, 2 or 3 wherein said system is configured to be controlled by a computer.

24. An imaging system as claimed in any one of claims 1, 2 or 3 wherein said imaging system is a macroscope and said system can be operated to image an object in reflected light, transmitted light, fluorescence, photoluminescence or multi-photon fluorescence.

25. An imaging system as claimed in claim 7 wherein said immersion liquid is one of water and oil.

26. An imaging system as claimed in any one of claims 1, 2 or 3 wherein said diffraction-limited configuration is one of a spot and a line.

27. An imaging system as claimed in claim 5 wherein said system has a beam expander, said beam expander being located to expand said light beam prior to said light beam entering said beamsplitter.

28. An imaging system as claimed in claim 1 wherein said system is a multi-photon or two-photon system and said illumination source is a laser, there being a filter in front of said detector to filter said light beam.

29. An imaging system as claimed in claim 9 where said imaging system is a fluorescence imaging system and said beamsplitter is a dichroic beam splitter.

30. An imaging system as claimed in claim 9 wherein there is a filter used with said beamsplitter on a side toward said detector.

31. An imaging system as claimed in any one of claims 1, 2, 3 or 6 wherein said system is used in combination with one selected from the group of image guided surgery, image guided microsurgery, image guided photodynamic therapy, multi-photon fluorescence imaging, and for exciting a small volume inside a semi-conductor.

32. An imaging system as claimed in any one of claims 1, 2 or 3 wherein said object is a living body and said system takes images in-vivo.

33. An imaging system as claimed in any one of claims 1, 2 or 3 wherein said system is used in combination with surgery or microsurgery using a laser for cutting tissue.

34. An imaging system as claimed in any one of claims 1, 2 or 3 wherein said system is used in combination with surgery or microsurgery where said surgery or microsurgery has a short pulse laser to generate multi-photon absorption for cutting tissue.

35. An imaging system as claimed in any one of claims 1, 2 or 3 wherein said system is used in combination with a semi-conductor for optical beam induced current generation within said semi-conductor using a short pulse laser that results in multi-photon or two-photon absorption at a focus volume inside said semi-conductor.

36. An imaging system as claimed in any one of claims 1, 2, 3 or 6 wherein said light source is a laser, the intensity of said laser being adjustable and controllable to enable said imaging system to perform at least one of image guided microsurgery, image guided surgery, microsurgery, image guided photo dynamic therapy, multi-photon fluorescence imaging or to excite a small volume inside a semi-conductor.

37. An imaging system as claimed in any one of claims 1, 2, 3 or 6 wherein said light source is a laser and said object is a semi-conductor, said system being constructed to control an intensity of said laser, said laser being intense enough to test or repair said semi-conductor.

38. An imaging system as claimed in any one of claims 1, 2, 3 or 6 wherein said system is a multi-photon or two-photon imaging system and said light source is a laser, said object being a semi-conductor and said laser having a photon energy that is smaller than a bandgap energy of said semi-conductor.

39. An imaging system as claimed in any one of claims 1, 2 or 3 wherein the light source is one of an arc lamp, light emitting diode, white light and laser.

40. An imaging system as claimed in claim 5 wherein said imaging system is a multi-photon or two-photon system.

41. A method of imaging an object using an imaging system having an illumination source producing a light beam directed along an optical path towards said object, a scan lens having an external entrance pupil for focusing said light beam to a diffraction-limited configuration in a prescribed object plane, a scanner for scanning said light beam to move said diffraction-limited configuration in a pre-determined scan pattern on said object plane, a detector being located to receive light from said object plane and a display to produce a signal from said detector, said method comprising moving said scan lens relative to said object to coarse focus said system, subsequently maintaining said scan

lens in a fixed position relative to said object and moving a focusing lens relative to said scan lens to fine-focus said system.

42. A method of imaging an object using an imaging system having a laser as an illumination source that produces a light beam directed along an optical path toward said object, a scan lens for focusing said light beam to a diffraction-limited configuration in a prescribed object plane, said scan lens having an external entrance pupil, a scanner for scanning said light beam to move said diffraction-limited configuration in a pre-determined scan pattern on said object plane, a detector being located to receive light from said object plane and a display to produce a signal from said detector, an intensity of said laser being controllable, said method comprising moving said scan lens relative to said object to coarse focus said system, subsequently maintaining said scan lens in a fixed position relative to said object and moving a focusing lens relative to said scan lens to fine-focus said system, controlling an intensity of said laser to use said system as an imaging system and as a laser guided surgery or microsurgery system, continuing to fine-focus said systems while operating said systems.